Cisco 819 Machine to Machine Integrated Services Routers

The Cisco® 819 Integrated Services Router Family, designed in compact hardened and non-hardened form factors, is the smallest Cisco IOS® Software router with support for integrated fourth-generation (4G LTE) wireless WAN (mobile broadband backhaul) and WLAN capabilities. The Cisco 819 ISR gateway provides a rapidly deployable, highly available, reliable, and secure solution designed specifically for machine-to-machine (M2M) applications. Markets that benefit from these applications include industrial automation, transportation, financial, health care, utility, and retail. Fully integrated with Cisco IOS Software, the Cisco 819 family delivers, enterprise-class features, including highly secure data, voice, and video communications to stationary and mobile network nodes across wired and wireless links. Figure 1 shows a Cisco 819HG Integrated Services Router.

Figure 1. Cisco 819 Integrated Services Router

The Cisco 819 ISR is available in both non-hardened (Cisco 819G) and hardened (Cisco 819HG) versions. (Figures 2 and 3, respectively). Both models include support for 4G LTE wireless WAN (WWAN) speeds. Support for 4G offers cost-effective, rapidly deployable, reliable, and secure primary or backup connectivity. With support for industrial-grade components, the hardened Cisco 819HG extends the ISR M2M Gateway footprint and provides deployment flexibility. The Cisco 819HG is an ideal solution for stationary and mobile environments where space, heat dissipation, exposure to extreme temperatures, harsher environments, and low power consumption are critical factors.

For mobile applications, Cisco Mobile IP delivers transparent roaming across multiple wireless networks capable of covering wide geographic areas.

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Figure 2. Nonhardened Cisco 819 Integrated Services Router

Figure 3. Hardened Cisco 819 Integrated Services Router

A critical component of the Cisco M2M architecture, the Cisco 819 ISR serves as the single, horizontal platform which enhances the Cisco implementation of “any device, anywhere, any place” across multiple industries, including banking, retail, healthcare, manufacturing, government. It also provides the ability to extend Cisco product-based networks to small branch offices with a relatively low incremental investment, as well as to enable managed services offerings based on Cisco architecture.

Product Overview

The Cisco 819 Integrated Services Routers support the latest Third-Generation Partnership Project (3GPP) Release 8 LTE standards for 4G LTE. They provide persistent, reliable LTE connectivity with fallback and transparent handoff to earlier technologies. The Cisco 819 Routers have the following variants:

- C819HG-4G-V-K9 and C819G-4G-V-K9: Dedicated multimode LTE for Verizon Wireless networks (700-MHz B13); the multimode C819 is backward-compatible with code division multiple access (CDMA) 1x/ EV-DO Rev A: 800 and 1900 MHz
- C819HG-4G-A-K9 and C819G-4G-A-K9: Multimode LTE for AT&T (700MHz B17); multimode C819 is backward-compatible with Universal Mobile Telecommunications Service (UMTS), high-speed packet access plus (HSPA+): 850, 1900, and 2100 MHz
- C819HG-4G-G-K9 and C819G-4G-G-K9*: Multimode LTE for carriers that operate LTE 800-MHz, 900-, 1800-, 2100-, or 2600-MHz networks; the multimode C819 is backward-compatible with UMTS and HSPA+: 900 and 2100 MHz

*First customer shipment (FCS) in late Q4CY2012

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The Cisco 819 ISR family includes a broad range of enterprise-class features including:

- Security services, including firewall, intrusion prevention, VPN and Cisco ISR Web Security with ScanSafe which require no additional hardware or client software, This enables branch offices, manufacturing sites, hospitals, banks, and mobile fleets, for example to intelligently redirect web traffic to the cloud to enforce granular security and acceptable use policies over user web traffic. With this solution, you can deploy market-leading web security quickly and easily to protect branch office users from web-based threats, such as viruses, while saving bandwidth, money, and resources.
- Cisco WAN optimization system consists of WAAS Express (WE) routers and Wide-area Application Engines (WAEs) that work together to optimize TCP traffic in your network. When client and server applications attempt to communicate with each other, the network intercepts the traffic and acts on behalf of the client application and the destination server.
- Additional WAN options such as Serial and Gigabit Ethernet WAN interfaces and a 4-port 10/100 Fast Ethernet Managed switch for LAN connectivity. The Cisco 819 provides quality-of-service (QoS) features for optimizing voice and video applications.
- Cisco Configuration Professional is a web-based configuration tool that simplifies setup and deployment. Centralized management capabilities give network managers visibility and control of the network configurations at remote sites.
- With enhanced data rates and improved latency (30 milliseconds or less), WWAN services are an ideal way to supplement traditional wireline services. The 4G LTE wireless WAN (WWAN) data services offered today have average data rates well in excess of ISDN speeds, with theoretical limits of 100 Mbps on the downlink and 50 Mbps on the uplink. The actual data speed depends on the service provider's network. With 4G LTE data rates, the Cisco 4G LTE WWAN Cisco 819 offers a primary WAN link solution capable of running comprehensive branch-office services, including voice and video services. The 4G LTE WWAN data services can also be used as a cost-effective alternative in areas where broadband services are either not available or very expensive. Cisco is building on these performance milestones and adding support for wireless to our wide variety of WAN interface alternatives.

Business Benefits and Application Examples

Businesses are looking for ways to reduce costs, increase revenue, and improve business continuity. The 4G LTE wireless connectivity, which is 10 to 15 times faster and has 5 times lower latency than 3G links, allows a small enterprise branch office or remote office to set up comprehensive media services in a matter of hours, without worrying about availability of broadband services and the need for laying down the lines. Wireless carriers offer flexible, usage-based data plans that can be catered to meet the needs and price points of the business customer. As WAN backup alternatives, 3G and 4G LTE wireless offer greater WAN diversity and resiliency because they are independent of the local terrestrial infrastructure. The Cisco 819 enables businesses to stay productive during service provider downtime or a network failure.

Ability to Host Networks in Motion

The Cisco 819 uses standards-based Mobile IP features in Cisco IOS Software to host networks in motion. Transition to different wireless networks is transparent to the users and devices (such as laptops, smart devices, and surveillance cameras), and applications maintain continuous connectivity without the user's manual intervention as WAN links change. In addition to allowing a single node or device to stay connected, the Cisco 819 allows an entire mobile network or subnet to stay connected.

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Retail VPN

Retail stores migrating from dialup connections for point-of-sale transactions can use the 4G LTE wireless WAN option on the Cisco 819 for low-cost broadband access with the required security to comply with payment-card-industry and other data security requirements. Multiple devices and applications can then be added to the store network to take advantage of the increased bandwidth and to enable secure mobility and enhance productivity.

Managed Services

Service providers and value-added resellers can use the Cisco 819 as a platform to offer differentiated business-class security and wireless LAN (WLAN) services for small and medium-sized business (SMB) customers. Superior management capabilities such as Simple Network Management Protocol (SNMP) support with 3G MIB with 4G MIB extension and Cisco Configuration Professional make remote management and provisioning easier.

Primary Features and Benefits

Table 1 lists the features and benefits of the Cisco 819 Integrated Services Router.

Table 1. Features and Benefits of Cisco 819

Features	Benefits
Smallest Cisco ISR in both Hardened and Non-hardened Form Factors	
Single platform for multiple applications	• This single architecture is uniquely designed for deployments in multiple remote applications such as ATM machines, kiosks, small branch offices, remote teleworker sites, gas stations, telemetry, etc. and across all industries. • Hardened models extend the ISR footprint into deployments wherein the router is exposed to extreme environmental conditions such as heat dissipation, exposure to extreme temperatures, dust, splash water, shock and vibration..
Hardened Router Industrial-grade components	• The hardened router supports extended temperature ranges from –13 to 140ºF (–25 to 60ºC). • Meets 95 percent of the Non-Condensing Humidity Requirements, IP 41 per IEC 60529 for Vertical Falling Water and Pollution 3 for Dust. The router meets MIL-STD-810, SAEJ1455, and ENG3396 for Shock and Vibe standards. • Supports a variety of mounting options, including 35-mm din-rail per EN60715, floor mount, and wall mount, and offers both AC and DC* power options allowing for deployment flexibility..
Lightweight, compact size with low power consumption	• Can be deployed in many different environments where space, heat dissipation, and low power consumption are critical factors.
Increased performance to run concurrent services	• Performance allows customers to take advantage of broadband network speeds while running secure, concurrent data, voice, video, and wireless services.
Enhanced security	• An integrated stateful and application inspection firewall provides network perimeter security and high-speed IP Security (IPsec); 3DES and AES encryption offer data privacy over the Internet. • Intrusion prevention enforces security policies in a larger enterprise or service provider network. • Content filtering offers category-based URL classification and blocking, thus providing increased productivity and better use of company resources. • ScanSafe web security and filtering solution that requires no additional hardware or client software. Enables remote locations to intelligently redirect web traffic to the cloud to enforce granular security and acceptable use policies over user web traffic.
Multiple WAN and LAN Connections	
Four-port 10/100-Mbps managed switch	• Allows for multiple Ethernet device connectivity in a small office or other remote location with the ability to designate a port as the network edge. • VLANs allow for secure segmentation of network resources. • Multiple LAN and WAN devices can be connected to standard 10/100/Ethernet or serial interfaces.
WAN diversity	• Multiple WAN links are supported: Gigabit Ethernet, serial, and 4G LTE provide for business continuity and WAN diversity.
Transparent Roaming Between Wireless Networks	
Dual subscriber-identity-module (SIM) support	• Hardware readiness for Dual SIM provides for high reliability and cellular multihoming support for HSPA-based networks.

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Features	Benefits
Cisco IOS Mobile IP features	• Mobile IP offers transparent roaming for mobile networks, establishing a transparent Internet connection regardless of location or movement. This enables mission-critical applications to stay connected even when roaming between networks. • Assigned IP addresses to the home network are maintained in private or public networks.
Cisco IOS Mobile network features	• Allows an entire subnet or mobile network to maintain connectivity to the home network while roaming.
Multiple wireless WAN technologies	• Users can use the best wireless (4G LTE, 3.7G, 3.5G, or 3G) technology or network available.
Advanced IP Services in Standards-Based Cisco IOS Software	
Advanced security features	• Authorization and authentication determines which individuals and devices have access to the network. • Firewall protection provides perimeter security when using public networks. • 3DES and AES encryption provides for highly secure VPNs when transmitting and receiving data over public networks. • Intrusion detection monitors potential malicious activity within the network.
QoS features	• Provides traffic precedence to delay-sensitive or prioritized applications. • Facilitates low-latency routing of delay-sensitive applications such as streaming video.
IP Multicast	• Allows efficient broadcast of data or video for increased situational awareness, multiuser communications, or surveillance applications.
Management and manageability	• Network managers can remotely manage and monitor networks with SNMP, Telnet, or HTTP, and locally through a console port. • Support for extensive 3G- and 4G LTE-based MIBs allows for centralized management of remote devices and gives network managers visibility and control of the network configurations at the remote site. • Network managers can reset to a pre-designated golden image as well as configure an ISR through Cisco IOS Software or through an external reset button. • Network managers can upgrade 3G, 3.5G, 3.7G and 4G firmware and router configurations remotely and confirm enhancement verification. • Tight integration with Cisco IOS Software allows you to self-monitor the functions of the 3G, 3.5G, 3.7G and 4G modems and auto-recover from a failure. • Cisco Configuration Professional provides a web-based tool that simplifies setup and deployment. • Intuitive network management tools such as CiscoWorks and HP OpenView are supported.
Cisco WAN Optimization	• Cisco WAAS Express (WE) routers and Wide-area Application Engines (WAEs) work together to optimize TCP network traffic.. When client and server applications attempt to communicate with each other, the network intercepts the traffic and acts on behalf of the client application and the destination server. • WAASX is supported on the Serial/ GE WAN interface. WAASX support on the Wireless 3G/4G/WiFi will be available in late Q4CY2013

Product Specifications

Table 2 provides 4G LTE specifications for the Cisco 819 Integrated Services Router.

Table 2. 4G LTE Specifications

Region Theaters	C819(H)G-4G-V-K9	C819(H)G-4G-A-K9	C819(H)G-4G-G-K9
Bands	LTE Band13 (700 MHz)	LTE Band17 (700 MHz)	LTE Bands 1, 3, 7, 8, 20 B20(800), B8(900), B3(1800), B1(2100), and B7(2600) MHz
DL/UP speeds	50 and 25 Mbps	100 and 50 Mbps	100 and 50 Mbps
Europe	X	X	✓
United States	✓ Verizon Wireless	✓ AT&T Wireless	X

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Item	Specification		
4G LTE modem form factor	• Embedded (included with the router)		
Important 4G LTE features	• Auto-switch failover between primary and backup link • Multichannel-interface-processor (MIP) profile configuration • CDMA Data Retry • 3G MIB with 3G MIB extension and traps* • Remotely initiated data callback using voice* • Remotely initiated data callback using Short Message Service (SMS)* • Remote firmware upgrade over 4G LTE* • Virtual diagnostic monitoring • Mobile Equipment Personalization (MEP) lock and unlock capabilities • SIM lock and unlock capabilities		
Dual SIM support*	• Hardware-ready, high reliability, and cellular multi-homing support for Dual SIM card socket; compliant with ISO-7816-2 (SIM mechanical)		
SMS and Global Positioning System (GPS)*	• GPS antenna: SMA connector • Send and receive SMS (maximum 160 characters)* • Standalone GPS • Separate active GPS with SMA* • Configure multiple profile*		
MIBs	• 3G MIB with 3G MIB extension* (4G parameters are covered with 3G MIB and 3G MIB extension) • ENTITY MIB • IF MIB • 3G MIB with 3G MIB extension persistence*		
4G LTE network management and diagnostics	• In-band and out-of-band management using Telnet (Cisco IOS Software command-line interface [CLI]) and SNMP, including MIB II and other extensions • Industry-standard 4G LTE diagnostics and monitoring tools (QUALCOMM CDMA Air Interface Tester [CAIT] and Spirent Universal Diagnostic Monitor [UDM])		
Modem information	• Modem form factor: Embedded Peripheral Component Interconnect (PCI) minicard ◦ C819HG-4G-V-K9 & C819G-4G-V-K9: Sierra Wireless MC7750 ◦ C819HG-4G-A-K9 & C819G-4G-A-K9: Sierra Wireless MC7700 ◦ C819HG-4G-G-K9 & C819G-4G-G-K9: Sierra Wireless MC7710		
Programming interfaces	• Cisco IOS Software CLI		
Wireless technologies supported (performance and throughput)	**C819(H)G-4G-V-K9** LTE band 13 (700 MHz) Backward compatibility: ◦ CDMA 2800 and 1900 MHz ◦ UMTS WCDMA, HSDPA, HSUPA, and HSPA+ 850, 900, 1900, and 2100 MHz ◦ GSM and GPRS ◦ EDGE 850, 900, and 1800 MHz	**C819(H)G-4G-A-K9** LTE: AT&T: 700 MHz (B17) Backward compatibility: ◦ UMTS and HSPA+: 850, 1900, and 2100 MHz ◦ Quad-band EDGE, General Packet Radio Service (GPRS), and GSM	**C819(H)G-4G-G-K9** LTE Bands 1, 3, 7, 8, 20 B20(800), B8(900), B3(1800), B1(2100), and B7(2600) MHz Backward compatibility: ◦ UMTS and HSPA+: 900 and 2100 MHz ◦ DC-HSPA+, Tri-band EDGE, GPRS, and GSM
Included antenna	• Two multiband swivel-mount dipole antennae (4G- LTE-ANTM-D) are included with all Cisco 819 Routers.		
LED indicators for 4G	• Received signal strength indication (RSSI) (green) • WWAN (green) • SIM status (green/yellow) • 3G and 4G LTE service (green/amber) • GPS (green/yellow)* • SYS (green/yellow) • ACT (green/off)		
Carrier support	• For an updated list of carriers that offer services on the Cisco 819(H)G Series, please visit: http://www.cisco.com/go/m2m.		

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* Hardware-ready; software support with future IOS release FCS Q3CY2013

Table 3 lists the software features supported on the Cisco 819 Integrated Services Router.

Table 3. Cisco IOS Software Features on Cisco 819: Advanced IP Features Set (Default)

Feature	Description
Cisco IOS Software requirement	• Cisco IOS Software feature set: Universal Cisco IOS Software image • C819(H)G-4G-V-K9, C819(H)G-4G-A-K9 and C819(H)G-4G-G-K9: Mainline Cisco IOS Software Release 15.2(4)M3 with Modem Firmware 3.5x or later IOS release with respective Modem firmware.
IP and IP services features	• Routing Information Protocol Versions 1 and 2 (RIPv1 and RIPv2) • Generic routing encapsulation (GRE) and multipoint GRE (MGRE) • Cisco Express Forwarding • Standard 802.1d Spanning Tree Protocol • Layer 2 Tunneling Protocol (L2TP) • Layer 2 Tunneling Protocol Version 3 (L2TPv3) • Network Address Translation • Dynamic Host Configuration Protocol (DHCP) server, relay, and client • Dynamic Domain Name System (DNS) • DNS Proxy • DNS Spoofing • Access control lists (ACLs) • IPv4 and IPv6 Multicast • Open Shortest Path First (OSPF) • Border Gateway Protocol (BGP) • Performance Routing (PfR) • Enhanced Interior Gateway Routing Protocol (EIGRP) • Virtual Route Forwarding (VRF) Lite • Next Hop Resolution Protocol (NHRP) • Bidirectional Forwarding Detection (BFD) • Web Cache Communication Protocol (WCCP)
Switch features	• Auto Media Device In/Media Device Cross Over (MDI-MDX) • 8 802.1Q VLANs • MAC filtering • Switched Port Analyzer (SPAN) • Storm control • Smart ports • Secure MAC address • Internet Group Management Protocol Version 3 (IGMPv3) snooping • 802.1x

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Feature	Description
Security features	**Secure Connectivity:** • Secure Sockets Layer (SSL) VPN for secure remote access • Hardware-accelerated DES, 3DES, AES 128, AES 192, and AES 256 • Public-key-infrastructure (PKI) support • 20 IPsec tunnels • Cisco Easy VPN Client and Server • Network Address Translation (NAT) transparency • Dynamic Multipoint VPN (DMVPN) • Tunnel-less Group Encrypted Transport VPN • IPsec stateful failover • VRF-aware IPsec • IPsec over IPv6 • Adaptive control technology • Session Initiation Protocol (SIP) application layer gateway **Cisco IOS Firewall:** • Zone-Based Policy Firewall • VRF-aware stateful inspection routing firewall • Stateful inspection transparent firewall • Advanced application inspection and control • Secure HTTP (HTTPS), FTP, and Telnet Authentication Proxy • Dynamic and static port security • Firewall stateful failover • VRF-aware firewall **Content Filtering:** • Subscription-based content filtering with Trend Micro • Support for Websense and SmartFilter • Cisco IOS Software black and white lists **Integrated Threat Control:** • Intrusion prevention system (IPS) • Control Plane Policing • Flexible Packet Matching • Network foundation protection
QoS features	• Low Latency Queuing (LLQ) • Weighted Fair Queuing (WFQ) • Class-Based WFQ (CBWFQ) • Class-Based Traffic Shaping (CBTS) • Class-Based Traffic Policing (CBTP) • Policy-Based Routing (PBR) • Class-Based QoS MIB • Class of service (CoS)-to-differentiated services code point (DSCP) mapping • Class-Based Weighted Random Early Detection (CBWRED) • Network-Based Application Recognition (NBAR) • Link fragmentation and interleaving (LFI) • Resource Reservation Protocol (RSVP) • Real-Time Transport Protocol (RTP) header compression (cRTP) • Differentiated Services (DiffServ) • QoS preclassify and prefragmentation • Hierarchical QoS (HQoS)

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Feature	Description
Management features	• Cisco Configuration Professional • Cisco Configuration Express • Cisco Configuration Engine support • Cisco AutoInstall • IP service-level agreement (IP SLA) • Cisco IOS Embedded Event Manager (EEM) • CiscoWorks • Cisco Security Manager • Telnet, SNMPv3, Secure Shell (SSH) Protocol, CLI, and HTTP management • RADIUS and TACACS+ • Out-of-band management with external modem through virtual auxiliary port
High-availability features	• Virtual Router Redundancy Protocol (VRRP) (RFC 2338) • Hot Standby Router Protocol (HSRP) • Multigroup HSRP (MHSRP) • Dial backup with external modem through virtual auxiliary port • Dual SIM support for cellular multihoming
Metro Ethernet features	• Ethernet operations, administration, and maintenance (OAM) • Ethernet Local Management Interface (LMI) • IP SLA for Ethernet
IPv6 features	• IPv6 addressing architecture • IPv6 name resolution • IPv6 statistics • IPv6 translation: Transport packets between IPv6-only and IPv4-only endpoints (NAT-PT) • Internet Control Message Protocol Version 6 (ICMPv6) • IPv6 DHCP
Number of recommended users	20

Table 4 lists the system specifications, and Table 5 lists antenna specifications for the Cisco 819 Integrated Services Routers.

Table 4. System Specifications

Feature	Specification
Memory	
Default and maximum DRAM	1 GB
Default and maximum flash memory	1 GB
Interface Support	
Console or auxiliary port	• RJ-45: Single dual-purpose port, which provides direct connection to a console or external modem for management or backup access point
Mini-USB port (RSVD)	• Mini-USB port to support remote 4G LTE diagnostics and monitoring tools (QUALCOMM CAIT and Spirent UDM)*
WAN interfaces	• Wireless WAN with 4G LTE, 3.7G, 3.5G, and 3G speeds • 10/100/1000 Gigabit Ethernet port • Cisco Smart Serial Interface (sync, async, and bisync)
LAN interfaces	• Four 10/100 Fast Ethernet ports

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Feature	Specification
LEDs	• System OK (green/amber) • Activity (green) • WWAN (green/amber) • SIM status (green/amber) • RSSI (green) • 3G/4G LTE service (green/amber) • GPS (green/amber) • Speed and link for Gigabit Ethernet WAN port (green) • Speed and link for all Fast Ethernet LAN ports (green)
Serial WAN interface	• Support for both synchronous and asynchronous modes • Synchronous maximum speed of up to 8 Mbps • Asynchronous maximum speed of up to 115.2 kbps • Support for bisync modes • Support for network clock synchronization
Serial protocol support	• EIA-232, EIA-449, EIA-530, EIA-530A, V.35, and X.21
Cisco Smart Serial Cabling	Cisco Smart Serial connectors and supported cables: **Product Number** / **Cable Type** / **Length** / **Connector Type** CAB-SS-V35MT / V.35 DTE / 10 ft (3m) / Male CAB-SS-V35FC / V.35 DCE / 10 ft (3m) / Female CAB-SS-232MT / EIA/TIA-232 DTE / 10 ft (3m) / Male CAB-SS-232FC / EIA/TIA-232 DCE / 10 ft (3m) / Female CAB-SS-449MT / EIA/TIA-449 DTE / 10 ft (3m) / Male CAB-SS-449FC / EIA/TIA-449 DCE / 10 ft (3m) / Female CAB-SS-X21MT / X.21 DTE / 10 ft (3m) / Male CAB-SS-X21FC / X.21 DCE / 10 ft (3m) / Female CAB-SS-530MT / EIA/TIA-530 DTE / 10 ft (3m) / Male CAB-SS-530AMT / EIA/TIA-530A DTE / 10 ft (3m) / Male
Physical Characteristics	
Physical dimensions (H x W x D)	Cisco 819G 1.67 x 7.7 x 7.2 in. (42 x 196 x 183 mm)
	Cisco 819HG 1.73 x 7.7 x 8.1 in. (44 x 196 x 206 mm)
Weight	Cisco 819G 2.3 lb (1.0 kg)
	Cisco 819HG 3.2 lb (1.5 kg)
Mean time between failure (MTBF—Ground Benign)	• C819G-4G-V-K9: 214,000 hours • C819G-4G-A-K9: 226,000 hours • C819G-4G-G-K9: 293,000 hours
	• C819HG-4G-V-K9: 214,000 hours • C819HG-4G-A-K9: 226,000 hours • C819HG-4G-G-K9: 293,000 hours
Maximum platform power consumption	Cisco 819G 11 watts
	Cisco 819HG 11 watts
Environmental operating range	Cisco 819G 32 to 104°F (0 to 40°C)
	Cisco 819HG –13 to 140°F (–25 to 60°C)
Operating altitude	40°C up to 5000 ft* Above 5000 ft derate maximum operating temperature 1.50C per 1000 ft Maximum altitude: 10,000 ft
	55°C up to 5000 ft* Above 5000 ft derate maximum operating temperature 1.50C per 1000 ft Maximum altitude: 10,000 ft
Standard safety certifications	• UL 60950-1, 2nd edition • CAN/CSA C22.2 No. 60950-1, 2nd edition • EN 60950-1, 2nd edition • CB to IEC 60950-1, 2nd edition with all group differences and national deviations
EMC emissions	EN55022/CISPR22, CFR 47 Part 15, ICES003, VCCI-V-3, AS/NZS CISPR22, CNS13438, EN300-386, EN61000-3-2, EN61000-3-3, and EN61000-6-1
EMC immunity	EN55024/CISPR24, (EN61000-4-2, EN61000-4-3, EN61000-4-4, EN61000-4-5, EN61000-4-6, EN61000-4-11), and EN300-386
Radio immunity	EN301 489-1, EN 301 489-7, and EN301 489-24

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Feature	Specification
Cellular radio	EN 301 908-1, EN 301 908-2, EN 301 511, 47 CFR Part 22, 47 CFR Part 24 and EN 301 908-13
Operating conditions (Cisco 819HG only)	• Noncondensing humidity: 95% • IP 41 per IEC 60529 for Vertical Falling Water • Pollution 3 for Dust **Operational Vibration:** • MIL-STD-810G 2.2.1 Category 4; truck transportation over U.S. highways-restrained cargo • EN61373 functional random vibe—category 1, class B • SAE J1455 operating random vibe cap mounted truck • SAE J1455 Operating Sinusoidal Vibration, Category 3 **Nonoperational Vibration:** • MIL-STD-810G 2.3.9 Category 20—Ground vehicles • EN61373 simulated non-op long-life vibe—category 1, class B • SAE J1455 Nonoperating Sinusoidal Vibration, Category 3 **Operational Shock:** • MIL-STD-810G 2.2.2 Procedure 1, Functional Shock **Nonoperational Shock:** • MIL-STD-810G 2.2.2 Procedure 5, Crash Hazard • MIL-STD-810G 2.2.2 Procedure 6, Bench Handling • EN61373 non-op shock class B • SAE J1455 4.11.3.1 Handling test
Power specifications	**AC Power Adapter:** • Maximum power consumption: 25W • Meets efficiency Level V • Input voltage and currents supported: 100–264 VAC <0.5A • Maximum output power rating: 20W • For IP 41 need additional enclosure **DC Power Adapter:*** • Maximum power consumption: 26W • Input voltage and currents supported: 10 VDC minimum, 13.8 VDC nominal, 36 VDC maximum operating, and 42 VDC absolute maximum • Maximum output power rating: 20W • IP 41 compliant • Default: PWR2-20W-AC AC power supply

* Future external reference for 24V, 52V, and 72V DC for railway applications Q1CY2013

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Table 5. Antenna Specifications

Item	Specification
Included antenna	Two multiband 4G LTE swivel-mount dipole antennae are included with all Cisco 819 ISRs
Diversity (dual antennae)	C819(H)G-V-K9 C819(H)G-A-K9C819(H)G-G-K9: Diversity supported
Antenna 4G-ANTM-OM-CM	**Description:** • Multiband indoor omnidirectional antenna • Ceiling mount **Electrical Specifications:** • **Frequency range:** 698 to 960 MHz, 1575 MHz, and 1710 to 2690 MHz • **Gain:** 1 and 1.5 decibels relative to isotropic (dBi) (700 to 960 MHz), 1.7 and 3.2 dBi (1700 to 2200 MHz), 3 and 4 dBi (2500 to 2700 MHz) • **Maximum power:** 50W • **Connector:** TNC male • **VSWR:** 2.0:1 and 3.01:1 or less for GPS • **Nominal impedance:** 50 ohms • **Polarization:** Linear vertical **Mechanical Specifications:** • **Radome material:** White ABS • **Dimensions (outside dimensions x height):** 5.64 in. x 2.0in. • **Weight:** 6.0 oz • **Temperature rating:** –40 to 185°F (–40 to 85°C) • **Can be used with the following cable extensions:** 3G-CAB-ULL-20 and 3G-CAB-ULL-50
Antenna 4G- LTE-ANTM-D	**Description:** • Cisco 4G LTE and 3G omnidirectional dipole antenna • Articulating joint; can be rotated 360 degrees and is capable of maneuvering into three stop positions: 0 degrees, 45 degrees, and 90 degrees • Plug threaded TNC connector: Directly mount the antenna on any Cisco 4G LTE or Cisco 3G wireless ISR enhanced high-speed WAN interface card (EHWIC) with a TNC connector; the threads on the connector must comply with the ANSI 7/16-28 UNEF 2B thread specification • Multiband swivel-mount dipole antenna • Faceplate mount (single unit included with all Cisco 4G LTE WWAN) **Electrical Specifications:** • **Operating frequency ranges:** 698 to 806 MHz, 824 to 894 MHz, 925 to 960 MHz, 1710 to 1885 MHz, 1920 to 1980 MHz, 2110 to 2170 MHz, and 2500 to 2690 MHz • **Maximum peak gain:** 2 dBi • **Maximum input power:** 3W • **Connector:** TNC plug • **Voltage standing wave ratio (VSWR):** < 2.5:1 or less • **Characteristic impedance:** 50 ohms **Mechanical Specifications:** • **Antenna dimensions (L x W x D):** 9 x 1.2 x 7/16 in. (229 x 30.5 x 11 mm) • **Temperature rating:** –22 to 158°F (–30 to 70°C) • **Antenna base and random color:** Cisco Raven Black
Antenna extension 4G-AE015-R	**Description:** • Single-unit antenna extension base (15 ft [457.2 cm]) **Electrical Specifications:** • **Frequency range:** 6 GHz • **Attenuation:** Less than 3 dB at or below 2.5 GHz • **Base connector:** TNC socket • **Pigtail connector:** TNC plug **Mechanical Specifications:** • **Base material:** Cisco gray UL94 V0 PC/ABS plastic • **Dimensions:** 2.8 x 2.4 x 1.8 in. (7.1 x 6.1 x 4.6 cm) • **Weight:** 6 oz (0.17 kg) • **Cable:** 15 ft (457.2 cm) nonplenum rated Pro-Flex Plus 195

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Item	Specification
Antenna extension 4G-AE010-R	**Description:** • Single-unit antenna extension base (10 ft [304.8 cm] cable included) **Electrical Specifications:** • **Frequency range:** 6 GHz • **Attenuation:** Less than 3 dB at or below 2.5 GHz • **Base connector:** TNC socket • **Pigtail connector:** TNC plug **Mechanical Specifications:** • **Base material:** UL 94 V0PC and ABS plastic • **Dimensions:** 2.8 x 2.4 x 1.8 in. (7.1 x 6.1 x 4.6 cm) • **Weight:** 6 oz (0.17 kg) • **Cable:** 10 ft (304.8 cm) nonplenum rated Pro-Flex Plus 195
ANT-4G-OMNI-OUT-N	**Description: Cisco outdoor omnidirectional antenna for 2G, 3G, and 4G LTE cellular:** • UV-stable radome • Mast-mounting bracket • Applicable for both 2G and 3G solutions • Domestic LTE 700 band and global LTE 2600 band • Domestic cellular and global GSM • WiMAX 2300 and 2500 **Electrical Specifications:** • **Frequency ranges:** 698 to 960 MHz, 1710 to 2170 MHz, and 2300 to 2700 MHz • **Nominal gain (dBi):** 698 to 960 MHz = 1.5 dBi, and 1710 to 2700 MHz = 3.5 dBi • **3 dB beam width (E plane):** 698 to 960 MHz = 81 degrees, 1710 to 2170 MHz = 75 degrees, and 2300 to 2700 MHz = 100 degrees • **3 dB beam width (H plane):** 360 degrees, omnidirectional • **Polarization:** Vertical and linear • **Normal impedance:** 50 ohms • **VSWR:** < 2.5:1 (698 to 960 MHz) and < 2.0:1 (1710 to 2690 MHz) • **Radiation pattern:** Omnidirectional **Mechanical Specifications:** • **Mount style:** Mast mount, upright position only • **Environment:** Outdoor • **Connector:** N-type socket • **Antenna length (height):** 9.8 x 1 in. (24.9 x 2.45 cm) • **Weight:** 1.5 lb (0.68 kg) • **Dimensions (H x Outside dimensions):** 9.8 x 1 in. (248 x 24.5 mm) • **Operating temperature range:** –22 to 158℉ (¬30 to 70℃) • **Storage temperature:** –40 to 185℉ (–40 to 85℃) • **Maximum power:** 20W • **Radome:** Polycarbonate, UV, white • **Material substance compliance:** ROHS compliant

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Item	Specification
ANT-4G-SR-OUT-TNC	**Description: Cisco integrated 4G LTE low-profile outdoor saucer antenna:** • Applicable for both 3G and 4G LTE solutions • Domestic LTE 700 band and global LTE 2600 band • Domestic cellular and global GSM • Weatherproof UV stable radome • Performance optimized • Excellent flame rating **Electrical Specifications:** • **Frequency ranges:** 698 to 960 MHz and 1710 to 2700 MHz • **Peak gain with 1-ft cable:** 1.5 dBi (698 to 960 MHz) and 3.7 dBi (1710 to 2700 MHz) • **Peak gain with 15-ft cable:** 0.8 dBi (698 to 960 MHz) and 0.2 dBi (1710 to 2700 MHz) • **Average efficiency with 1-ft cable:** 90% (698 to 960 MHz) and 82% (1710 to 2700 MHz) • **Average efficiency with 15-ft cable:** 60% (698 to 960 MHz) and 40% (1710 to 2700 MHz) • **Polarization:** Linear and vertical • **Nominal impedance:** 50 ohms • **VSWR (maximum):** 2.0:1 (698 to 960 MHz) and 2.0:1 (1710 to 2700 MHz) • **H-plane (3-dB beam width):** Omnidirectional **Mechanical Specifications:** • **Power:** 3W • **Cable:** 15-ft LMR 195 • **RF connector:** Type N (f); TNC (plug) available • **Mount style:** Ceiling mount • **Radome:** PC/ABS, UV stable, black • **Material substance compliance:** RoHS compliant • **Operational temperature:** –22 to 158℉ (–30 to 70℃) • **Storage temperature:** –40 to 185℉ (–40 to 85℃) • **Environment:** Indoor • **Dimensions (H x Outside dimensions):** 3.4 x 7.9 in. (87 x 200 mm)
ANT-4G-PNL-OUT-N	**Description: Cisco multiband panel outdoor 4G LTE antenna:** • Supports 3G and 4G LTE solutions • Supports bands • Wall-mount and mast-mount • Indoor and outdoor • Dual type-N socket connector **Electrical Specifications:** • **Frequency Ranges:** 698 to 960 MHz and 1710 to 2700 MHz • **VSWR:** 2.0:1 maximum • **Gain:** 5.5 to 10.5 dBi (698 to 960 MHz) and 6.5 to 9.0 dBi (1710 to 2700 MHz) • **3-dB beam width (vertical plane):** 55 to 70 degrees = 698 to 960 MHz, 53 to 98 degrees = 1710 to 2200 MHz, 60 to 70 degrees = 2200 to 2500 MHz, and 55 to 70 degrees = 2500 to 2700 MHz • **3-dB beam width (horizontal plane):** 55 to 70 degrees = 698 to 960 MHz and 50 to 90 degrees = 1710 to 2200 MHz • **F/B ratio:** > 15 dB, typical 20 dB = 698 to 960 MHz, and > 17 dB, typical 23 dB = 1700 to 2700 MHz • **Isolation:** > 30 dB • **Polarization:** Slant +/– 45 degrees • **Nominal impedance:** 50 ohms • **Radiation pattern:** Directional

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Item	Specification
	Mechanical Specifications: Mount style: Wall or mast mount • **Environment:** Outdoor • **Connector:** Dual type-N socket (direct connect or dual 12 in. [30 cm]) • **Antenna length (height):** 11.6 in. (2.95 cm) • **Temperature range (operating):** –22 to 158℉ (–30 to 70℃) • **Storage temperature:** –40 to 185℉ (–40 to 85℃) • **Wind rating:** 160 km per hr • **IP rating:** IP 54 • **Radome:** Polycarbonate, UV resistant, white Material substance compliance: **ROHS compliant**
CGR-LA-NM-NF* **CGR-LA-NF-NF***	**Description: Cisco Lightning Arrestor** • Broadband operation • DC continuity for outdoor powering • Reversed installation **Permanently installed gas capsule** **Feature Description** • **Arrestor Type:** Gas discharge tube • **Main path connectors:** Port 1: protected, N plug (male), Port 2: unprotected, N jack (female, bulkhead side) • **Impedance:** 50 ohms • **Frequency range:** 0 MHz to 5800 MHz • **Return loss:** Greater than or equal to 20 dB • **Insertion loss:** Less than or equal to 0.2 dB • **RF CW power:** Less than or equal to 60 W • **Surge current handling capability:** 10 single, multiple kA (test pulse 8/20 ms) • **Residual pulse energy:** 250 microsecond typically (test pulse 4 kV 1.2/50 microsecond; 2kA 8/20 microsecond), main path (protected side) • **Operating temperature range:** -40-degrees F to 185-degrees F (-40-degrees C to 85-degrees C) • **Waterproof rating:** IP 67 (according to IEC 60529, data refer to the coupled state) • **Mounting and grounding:** MH24 (bulkhead) • Material ◦ **Housing:** brass ◦ **Port 1 center contact:** gold-plated brass **Port 2 center contract copper beryllium alley**

* –N antenna works with –N cables and –N lighting arrestor

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Ordering Information

For Cisco ISR 819 4G ordering information, please visit the Cisco Ordering Home Page and refer to Tables 6 and 7.

Table 6. Cisco 819 Integrated Services Router Ordering Information

Product	Description
Cisco 819H Hardened Integrated Services Router	
C819HG-4G-V-K9	Compact Hardened 4G LTE Secure IOS Router with MDM9600 for VERIZON, 700 MHz Band 13 / CDMA Rev A
C819HG-4G-A-K9	Compact Hardened 4G LTE Secure IOS Router with MDM9200 for AT&T, 700 MHz Band 17, 850/1900/2100 MHz UMTS/HSPA bands
C819HG-4G-G-K9	Compact Hardened 4G LTE Secure IOS Router with MDM9200 for EUROPE, LTE 800/900/1800/ 2100/2600 MHz, 900/1900/2100 MHz UMTS/HSPA bands
Cisco 819 Non-hardened Integrated Services Router	
C819G-4G-V-K9	Compact 4G LTE Secure IOS Router with MDM9600 for VERIZON, 700 MHz Band 13 / CDMA Rev A
C819G-4G-A-K9	Compact 4G LTE Secure IOS Router with MDM9200 for AT&T, 700 MHz Band 17, 850/1900/2100 MHz UMTS/HSPA bands
C819G-4G-G-K9	Compact 4G LTE Secure IOS Router with MDM9200 for EUROPE, LTE 800/900/1800/ 2100/2600 MHz, 900/1900/2100 MHz UMTS/HSPA bands
Power Supplies and Mounting Brackets	
PWR2-20W-AC	AC Power Adapter for the Cisco 810 Series ISR (Default)
PWR2-20W-12VDC	12V DC Power Adapter for vehicle for the Cisco 810 Series ISR
PWR2-20W-24VDC	24V DC Power Adapter for vehicle for the Cisco 810 Series ISR*
ACS-810-DM	Desktop Mounting Kit for the Cisco 810 Series ISR
ACS-810-FWM	Floor Mount and Wall Mount Kit for the Cisco 810 Series ISR
IOS SW and Licenses	
S81UK9-15204M	Cisco 810 Series IOS Universal Data (Default)
S81NPEK9-15204M	Cisco 810 Series IOS Universal Data with No Payload Encryption
SL-810-AIS	Cisco 810 Advanced IP Services License (Default)
SL-810-ADVSEC	Cisco 810 Advanced Security Software License (Default)
SL-810-AIS-NPE	Cisco 810 Advanced IP Services License with No Payload Encryption (Default with NPE IOS Image)
SL-810-ADVSEC-NPE	Cisco 810 Advanced Security Software License with No Payload Encryption (Default with NPE IOS Image)

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Table 7. Antenna Ordering Information

Description	Part Number
Multi-Band Swivel Mount Dipole Antenna-Faceplate Mount	4G-LTE-ANTM-D 4G-LTE-ANTM-D= (Spare)
Multi-Band Omnidirectional Antenna-Ceiling Mount	4G-ANTM-OM-CM 4G-ANTM-OM-CM= (Spare)
Single Unit Antenna Extension Base (10-ft cable included)	4G-AE010-R 4G-AE010-R= (Spare)
Single Unit Antenna Extension Base (15-ft cable)	4G-AE015-R 4G-AE015-R= (Spare)
50-ft (15m) Ultra Low Loss LMR 400 Cable with TNC Connector	4G-CAB-ULL-50 4G-CAB-ULL-50= (Spare)
20-ft (6m) Ultra Low Loss LMR 400 Cable with TNC Connector	4G-CAB-ULL-20 4G-CAB-ULL-20= (Spare)
25-ft (7.5 m) Low Loss LMR 240 Cable with TNC Connector	4G-CAB-LMR240-25 4G-CAB-LMR240-25= (Spare)
50-ft (15 m) Low Loss LMR 240 Cable with TNC Connector	4G-CAB-LMR240-50 4G-CAB-LMR240-50= (Spare)
75-ft (23 m) Low Loss LMR 240 Cable with TNC Connector	4G-CAB-LMR240-75 4G-CAB-LMR240-75= (Spare)
Multiband Omni-Directional Stick Outdoor 4G Antenna	ANT-4G-OMNI-OUT-N
Multiband Low-Profile Saucer Outdoor 4G Antenna	ANT-4G-SR-OUT-TNC
Multiband Panel Outdoor 4G Antenna	ANT-4G-PNL-OUT-N
50-ft (15m) Ultra Low Loss LMR 400 Cable TNC-N Connector	CAB-L400-50-TNC-N
20-ft (6m) Ultra Low Loss LMR 400 Cable with TNC-N Connector	CAB-L400-20-TNC-N
20-ft (6m) Ultra Low Loss LMR 400 Cable with N Connectors	CAB-L400-20-N-N
Lightning Arrestor Kit: female to female	CGR-LA-NF-NF
Lightning Arrestor Kit: male to female	CGR-LA-NM-NF

For More Information

For more information about the Cisco 819 products, visit http://www.cisco.com/go/m2m or contact your local Cisco account representative.

For more information regarding Cisco 800 Series Integrated Services Routers and options, contact your Cisco representative or go to http://www.cisco.com/go/isr.

For installation guidance, visit
http://www.cisco.com/en/US/docs/routers/connectedgrid/antennas/installing/Overview.html

Cisco and Partner Services for the Borderless Network Architecture

Enable the Cisco Borderless Networks Architecture and the business solutions that run on it with intelligent, personalized services from Cisco and our partners. Backed by deep networking expertise and a broad ecosystem of partners, these services can help you plan, build, and run a network that enables you to expand geographically, embrace new business models, and promote business innovation. Whether you are looking to transition to a Cisco Borderless Networks Architecture, solve specific business problems, or improve operational efficiency, we have a

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service that can help you get the most from your IT environment. For more information, please visit http://www.cisco.com/go/services.

Warranty Coverage and Technical Service Options

The Cisco 819 Integrated Services Router comes with the Cisco 1-year limited hardware warranty. Adding a contract for a technical service offering such as Cisco SMARTnet® Service provides benefits not available with warranty, including access to OS updates, Cisco.com online resources, and Cisco Technical Assistance Center (TAC) support services. Table 8 shows the available technical services.

For information about Cisco warranties, visit http://www.cisco.com/go/warranty.

For information about Cisco Technical Services, visit http://www.cisco.com/go/ts.

Table 8. Cisco Technical Services for Cisco 819 Integrated Services Routers

Technical Services
Cisco SMARTnet Service • Global access to the Cisco TAC 24 hours a day • Unrestricted access to the extensive Cisco.com resources, communities, and tools • Next-business-day, 8 x 5 x 4, 24 x 7 x 4, and 24 x 7 x 2 advance hardware replacement[1] and onsite parts replacement and installation available • Ongoing operating system software updates within the licensed feature set[2] • Proactive diagnostics and real-time alerts on Smart Call Home-enabled devices
Cisco Smart Foundation Service • Next-business-day advance hardware replacement as available • Business-hours access to small and medium-sized business (SMB) Cisco TAC (access levels vary by region) • Access to Cisco.com SMB knowledge base • Online technical resources through Smart Foundation Portal • Operating system software bug fixes and patches

[1]Advance hardware replacement is available in various service-level combinations. For example, 8 x 5 x Next business day (NBD) indicates that shipment will be initiated during the standard 8-hour business day, 5 days a week (the generally accepted business days within the relevant region), with NBD delivery. Where NBD is not available, same-day shipment is provided. Restrictions apply; please review the appropriate service descriptions for details.

[2]Cisco operating system updates include maintenance releases, minor updates, and major updates within the licensed feature set.

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